STOHLGREN, THOMAS J., and RICHARD R. BACHAND. National Biological Service, Natural Resource Ecology Laboratory, Colorado State University, Ft. Collins, CO, 80523, USA. Predicting long-term forest change at landscape scales: What will we need to know?

We are quantifying the abiotic and biotic controls on forest distributions to assess potential vegetation change in Rocky Mountain National Park, Colorado. A series of long-term vegetation transects are being established to relate the physical environment (i.e., elevation, slope, PAR) and soil characteristics (i.e., soil depth, texture, summer soil moisture) to tree species basal area across lodgepole pine (Pinus contorta var. latifolia) ecotones. Stepwise multiple linear regression results from eight 200+ m ecotonal transects (98 20 m x 20 m plots) show that basal area gradients from lodgepole pine to spruce-fir (Picea engelmannii, Abies lasiocarpa) are correlated strongly with summer soil moisture (partial $R^2 = 0.44$); lodgepole pine to ponderosa pine (Pinus ponderosa) ecotones are correlated strongly with PAR, slope, %silt, rockiness, and %clay (partial $R^2 = 0.79$); and lodgepole pine to limber pine (Pinus flexilis) forests are correlated largely with elevation, PAR, %sand, and %clay (partial $R^2 = 0.84$). Factors controlling species-specific radial growth patterns along ecotones are more complex. Canonical correspondence analysis results suggest that: (1) different factors control a species upper- and lower-elevation limits; and (2) asymmetrical competition for resources occurs between tree species' where their ranges overlap. Predicting long-term coniferous forest change at landscape scales will require a far better understanding of species-environment relationships than we have today.